LG STUDIOWORKS 77M

MODEL

SERVICE MANUAL

SPECIFICATIONS

1. PICTURE TUBE

Size : 17 inch (Flat Square Tube)
Gun : In-line
Deflection Angle : 90°
Neck Diameter : 29.1 mm
Dot Pitch : 0.27 mm

2. SIGNAL

2-1. Horizontal & Vertical Sync
1) Input Voltage Level : Low=0~0.8V, High=2.5~5.5V
2) Sync Polarity : Positive or Negative

2-2. Video Input SIignal
1) Voltage Level : 0~0.7 Vp-p
a) Color 0, 0 : 0 Vp-p
b) Color 7, 0 : 0.467 Vp-p
c) Color 15, 0 : 0.7 Vp-p
2) Input Impedance : 75 Ω
3) Video Color : R, G, B Analog
4) Signal Format : Refer to the Timing Chart

2-3. Signal Connector
15 Pin D-Sub Connector

2-4. Operating Frequency
Horizontal : 30 ~ 70 kHz
Vertical : 50 ~ 160 Hz

3. STEREO AUDIO

3-1. Input Voltage : 0.707 Vrms
3-2. Input Impedance : 20kΩ min
3-3. Amp Output : 2W+2W rms
3-4. Speaker Impedance : 4Ω
3-5. Speaker Type : Dome, Bassreflex, Closed

.

4. POWER SUPPLY

4-1. Power Range
AC 100V~240V (Free Voltage), 50/60Hz, 2.3A Max.

4-2. Power Consumption

MODE	H/V SYNC	POWER CONSUMPTION	LED COLOR
NORMAL (ON)	ON/ON	less than 120W	GREEN
STAND-BY	OFF/ON	less than 15W	ORANGE
SUSPEND	ON/OFF	less than 15W	
OFF	OFF/OFF	less than 8W	ORANGE

5. DISPLAY AREA

5-1. Active Video Area : 310 x 230 mm (12.20" x 9.06")
5-2. Display Color : Full Colors
5-3. Display Resolution : 1024 Dots x 768 Lines / 85Hz
1280 Dots x 1024 Lines / 60Hz
5-4. Video Bandwidth : 110 MHz

6. ENVIRONMENT

6-1. Operating Temperature: 15°C~30°C (59°F~86°F) (Ambient)
6-2. Relative Humidity : 8%~80% (Non-condensing)
6-3. Altitude : 5,000m

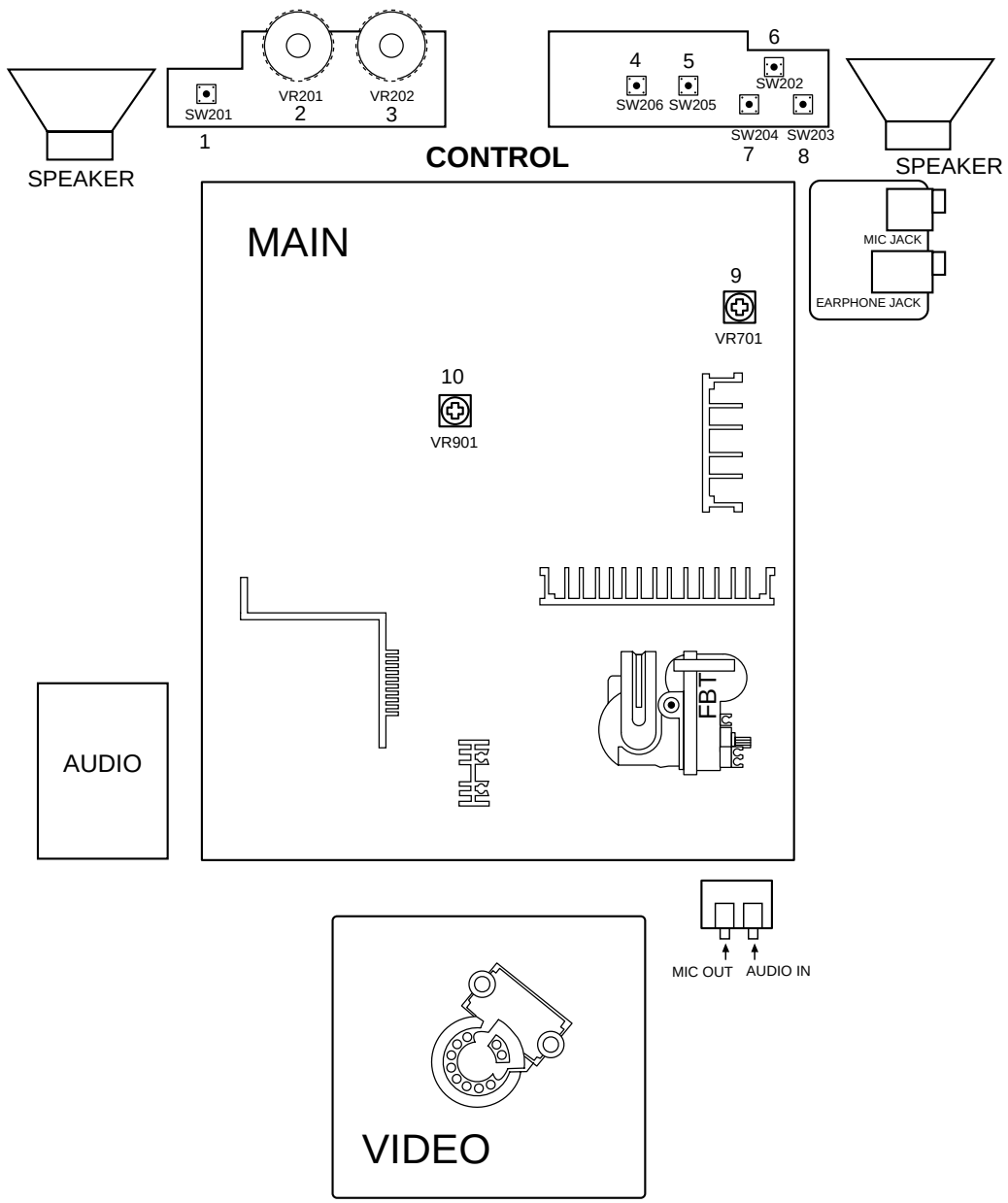
7. DIMENSIONS (With TILT/SWIVEL)

Width : 465.0 mm (18.31")
Depth : 442.0 mm (17.40")
Height : 435.5 mm (17.15")

8. WEIGHT (WithTILT/SWIVEL)

Net. Weight : 19.0 kg (41.89 lbs)
Gross Weight : 23.0 kg (50.71 lbs)

CONTROL LOCATIONS



No.	Ref. No.	Control Function	No.	Ref. No.	Control Function
1	SW201	POWER SWITCH	6	SW202	ENTER BUTTON
2	VR201	CONTRAST CONTROL	7	SW204	OSD SELECT RIGHT
3	VR202	BRIGHTNESS CONTROL	8	SW203	OSD SELECT LEFT
4	SW206	SOUND MUTE	9	VR701	H/V ADJUSTMENT
5	SW205	SOUND	10	VR901	B^+ ADJUSTMENT

ADJUSTMENT

GENERAL INFORMATION

All adjustment are thoroughly checked and corrected when the monitor leaves the factory, but sometimes several minor adjustment may be required.
Adjustment should be following procedure and after warming up for a minimum of 30 minutes.

- Alignment appliances and tools.
  - IBM compatible PC.
  - Programmable Signal Generator.
    (eg. VG-819 made by Astrodesign Co.)
  - E(E)PROM with each mode data saved.
  - Alignment Adaptor and Software.
  - Digital Voltmeter.
  - White Balance Meter.
  - Luminance Meter.
  - High-voltage Meter.

AUTOMATIC AND MANUAL DEGAUSSING

The degaussing coil is mounted around the CRT so that automatic degaussing when turn on the monitor. But a monitor is moved or faced in a different direction, become poor color purity cause of CRT magnetized, then press (DEGAUSSING) on the OSD menu.

ADJUSTMENT PROCEDURE & METHOD

- Install the cable for adjustment such as Figure 1 and run the alignment program on the DOS for IBM compatible PC.
- Set external Brightness and Contrast volume to max position.

1. Adjustment for B^+ Voltage.

1) Display cross hatch pattern at Mode 4.
2) Adjust C951 + voltage to 160±0.5Vdc with **VR901**.

2. Adjustment for High-Voltage.

1) Display cross hatch pattern at Mode 4.
2) Adjust FBT Anode voltage to 141±0.5Vdc with **VR701**.

5. Adjustment for Factory Mode (Preset Mode).

1) Display cross hatch pattern at Mode 1.
2) Run alignment program for MB776B on the IBM compatible PC.
3) COMMAND → START → Y(Yes) command.
4) DIST. ADJ. → TILT command.
5) Adjust tilt as arrow keys to be the best condition.
6) DIST. ADJ. → BALANCE command.
7) Adjust balance of side-pincushion as arrow keys to be the best condition.
8) DIST. ADJ. → FOS. ADJ → Mode No. → 1 command.
9) Adjust V-SIZE as arrow keys to 230±2mm.
10) Adjust V-POSITION as arrow keys to center of the screen.
11) Adjust H-SIZE as arrow keys to 310±2mm.
12) Adjust H-POSITION as arrow keys to center of the screen.
13) Adjust S-PCC (Side-Pincushion) as arrow keys to be the best condition.
14) Adjust TRAPEZOID as arrow keys to be the best condition.
15) Display from Mode 2 to Mode 7 and repeat above from number 9) to 14).
16) PRESET EXIT → Y(Yes) command.

6. Adjustment for White Balance and Luminance.

1) Set the White Balance Meter.
2) Press the (DEGAUSSING) on the OSD menu for demagnetization of the CRT.
3) Display color 0,0 pattern at Mode 4.
4) COLOR ADJ. → LUMINANCE command of the alignment program.
5) Set Brightness and Sub-Brightness to max position.
6) COLOR ADJ. → BIAS ADJ. → COLOR NO. → 1 command of the alignment program.
7) Check whether blue color or not at R-BIAS and G-BIAS to min position and adjust B-BIAS to 0.3±0.05FL of the raster luminance.
8) Adjust R-BIAS and G-BIAS command to x=0.281±0.01 and y=0.311±0.01 on the White Balance Meter with PC arrow keys.
9) Adjust SUB-BRIGHT command to 0.4±0.1FL of the raster luminance.
10) Display color 15,0 box pattern (70x70mm) at Mode 4.
11) DRIVE ADJ → No 1. command.
12) Set Contrast and Sub-Contrast to max position.
13) Set B-DRIVE to 2/3 150(96 decimal) position at DRIVE of the alignment program.
14) Adjust R-DRIVE and G-DRIVE command to white balance x=0.283±0.001 and y=0.298±0.001 on the White Balance Meter with PC arrow keys.
15) Adjust Sub-Contrast command to 54±2FL(MPR), 46±2FL(TCO) of the raster luminance.
16) Save in COLOR 1.

17) Display color 15,0 full white patten at Mode 4.
18) COLOR ADJ. → LUMINANCE → ABL command.
19) Adjust ABL to 35±1FL(MPR), 30±1(TCO) of the luminance.
20) Exit from the program.

*** Note :** Color mode 2 data is automatically save in the EEPROM by the microprocessor.

7. Adjustment for Focus.

1) Display H character in full screen at Mode 4.
2) Adjust two Focus control on the FBT that focus should be the best condition.

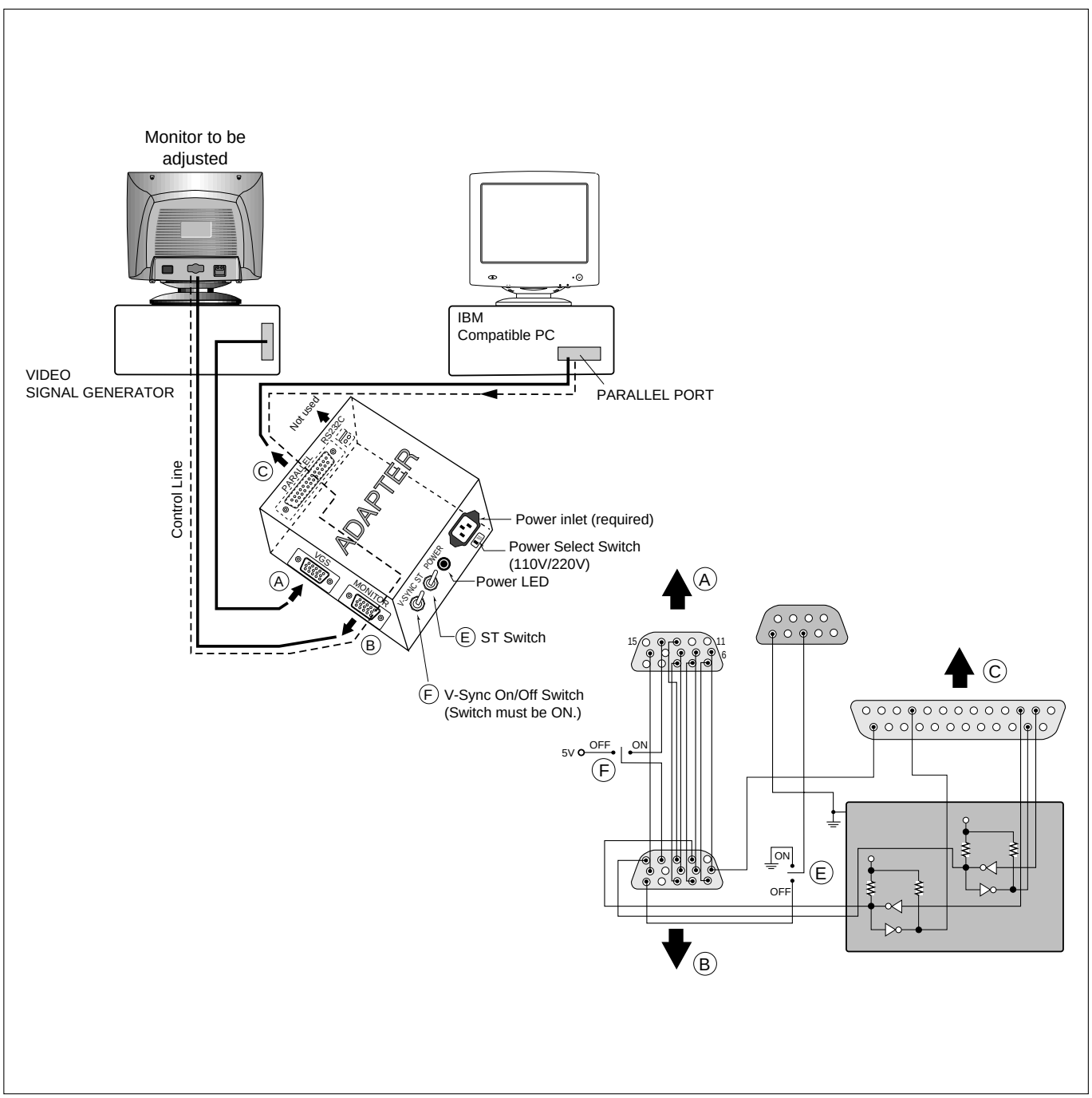
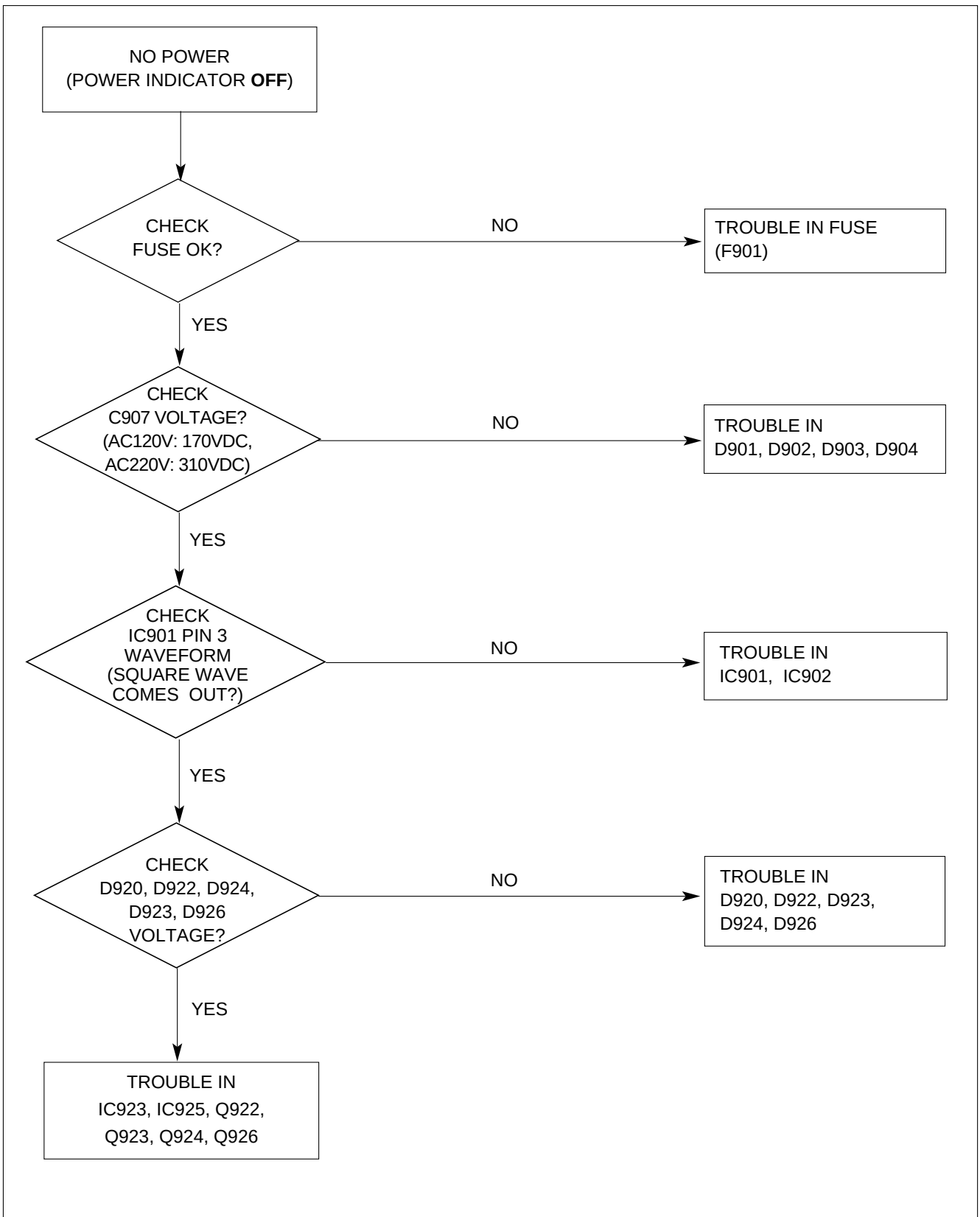


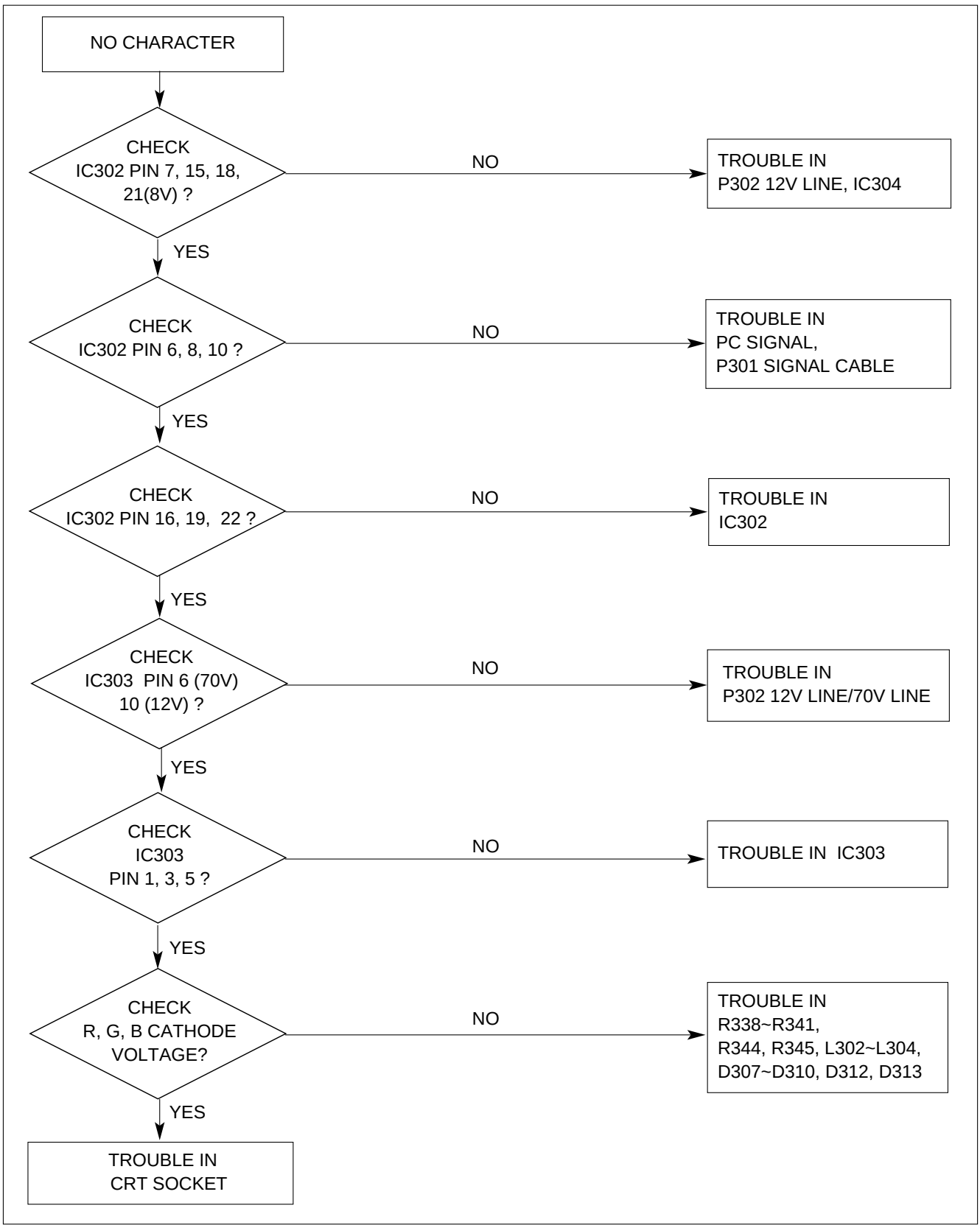
Figure 1. Cable Connection

TROUBLESHOOTING GUIDE

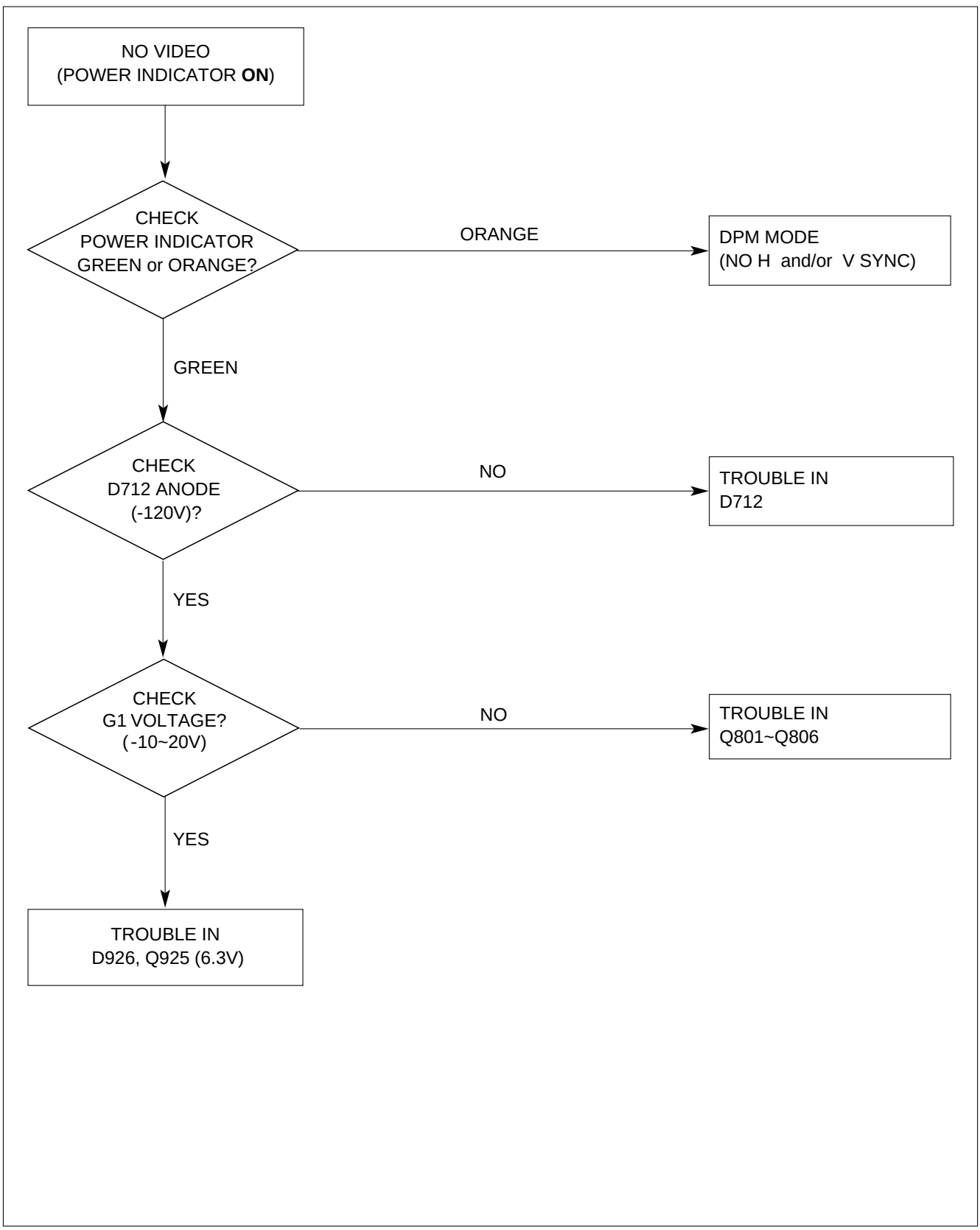
1. NO POWER



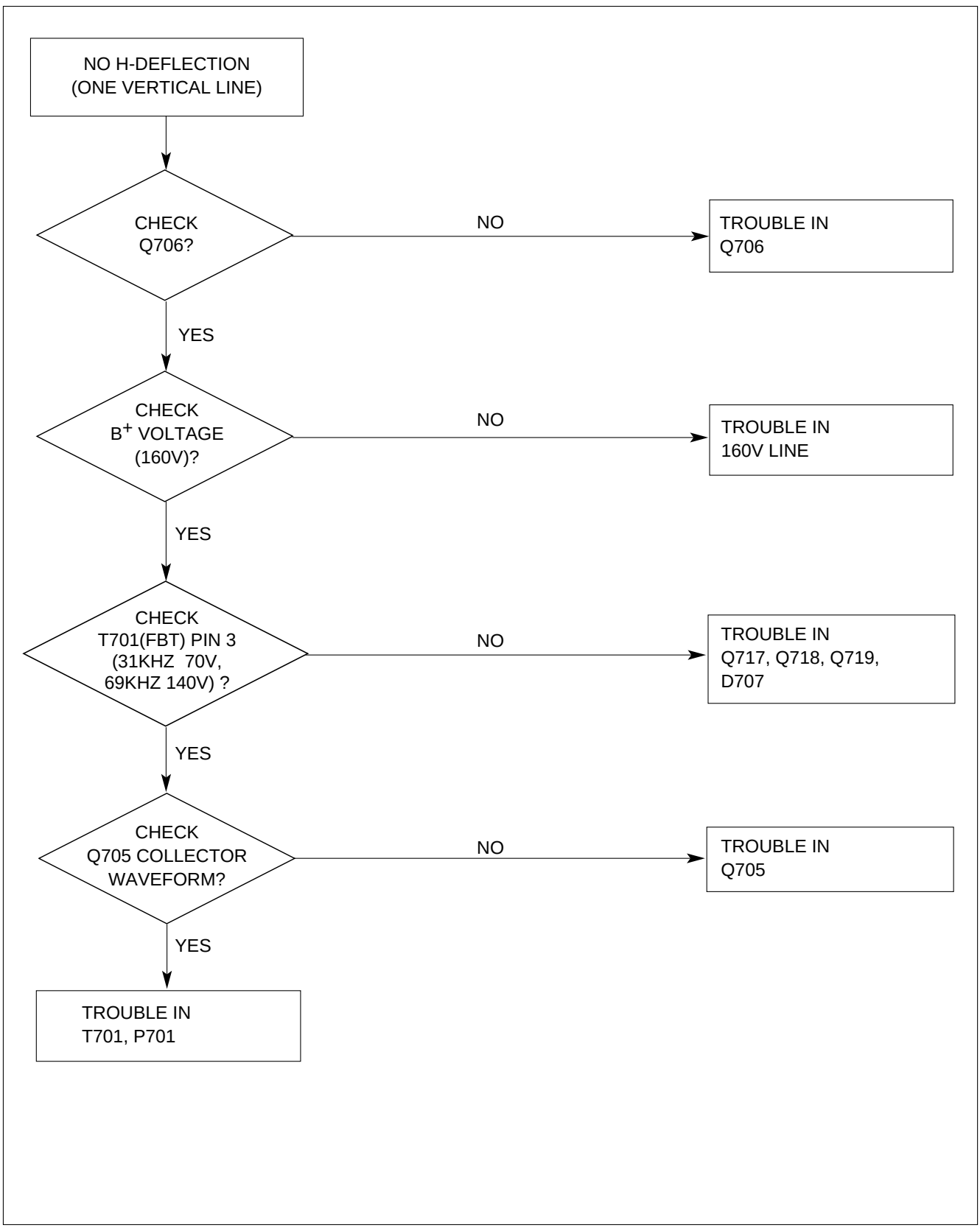
2. NO CHARACTER



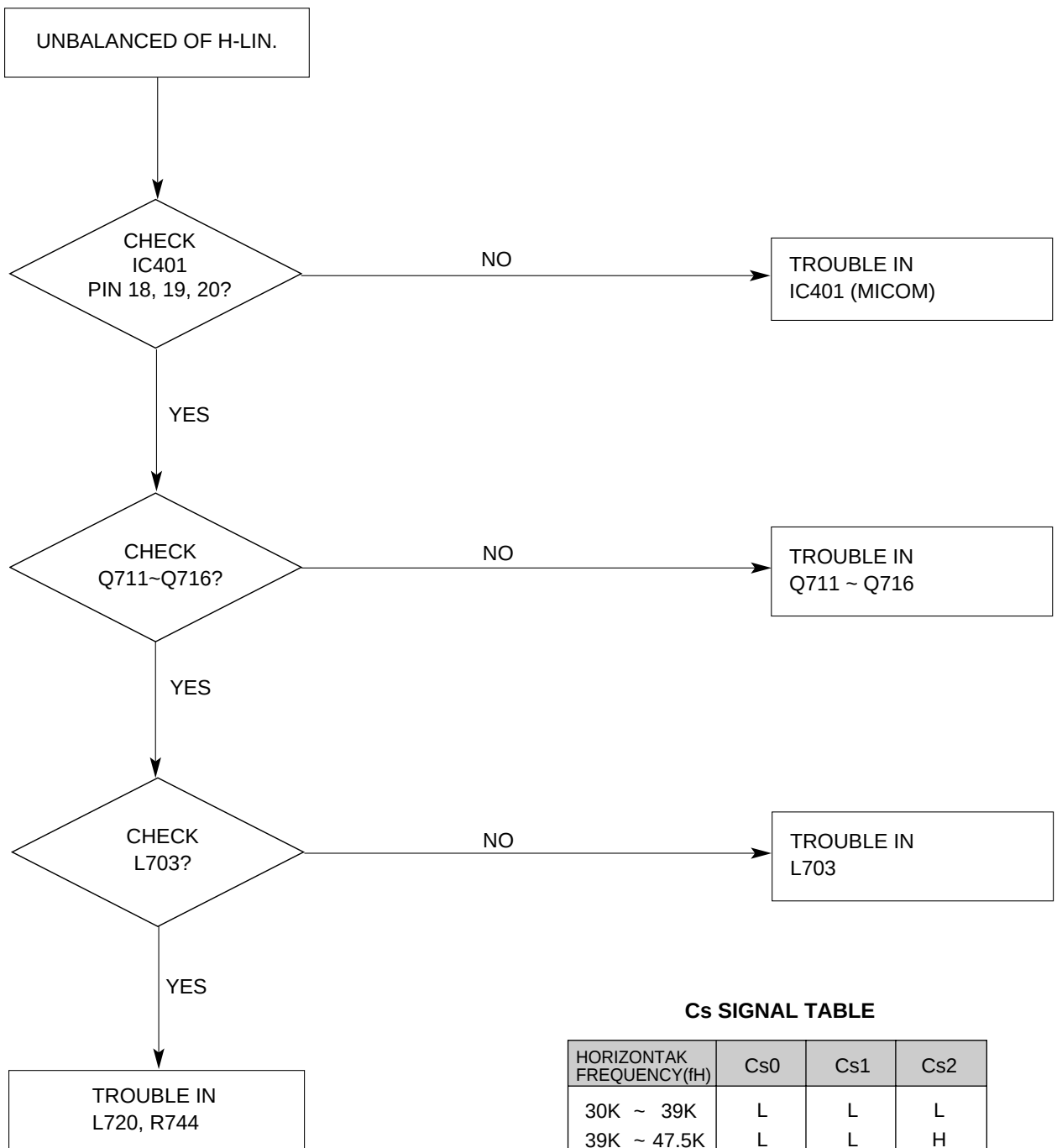
3. NO RASTER


NO VIDEO
(POWER INDICATOR **ON**)
CHECK
POWER INDICATOR
GREEN or ORANGE?
ORANGE
DPM MODE
(NO H and/or V SYNC)
GREEN
CHECK
D712 ANODE
(-120V)?
NO
TROUBLE IN
D712
YES
CHECK
G1 VOLTAGE?
(-10~20V)
NO
TROUBLE IN
Q801~Q806
YES
TROUBLE IN
D926, Q925 (6.3V)

4. NO HORIZONTAL DEFLECTION



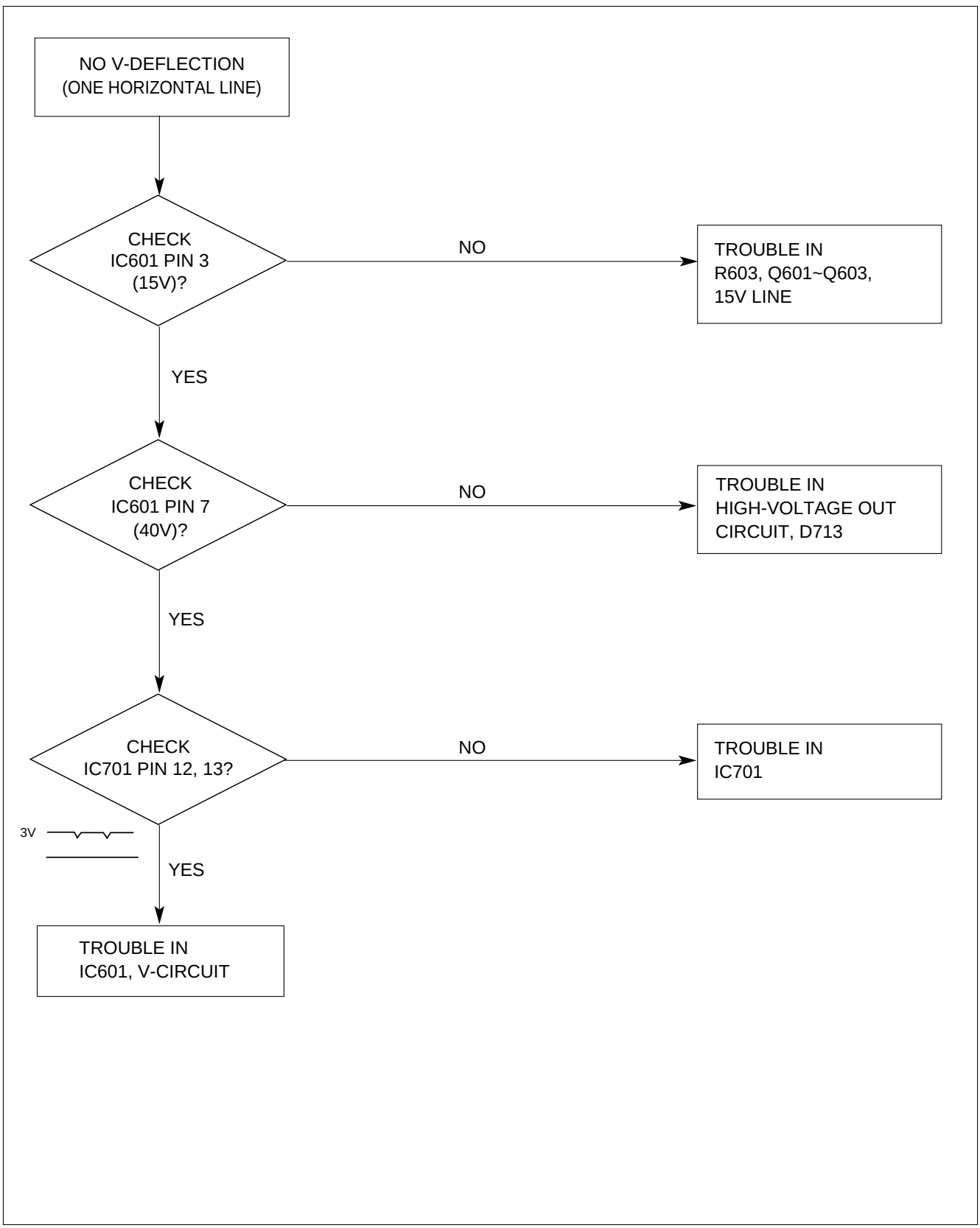
5. TROUBLE IN H-LINEARITY



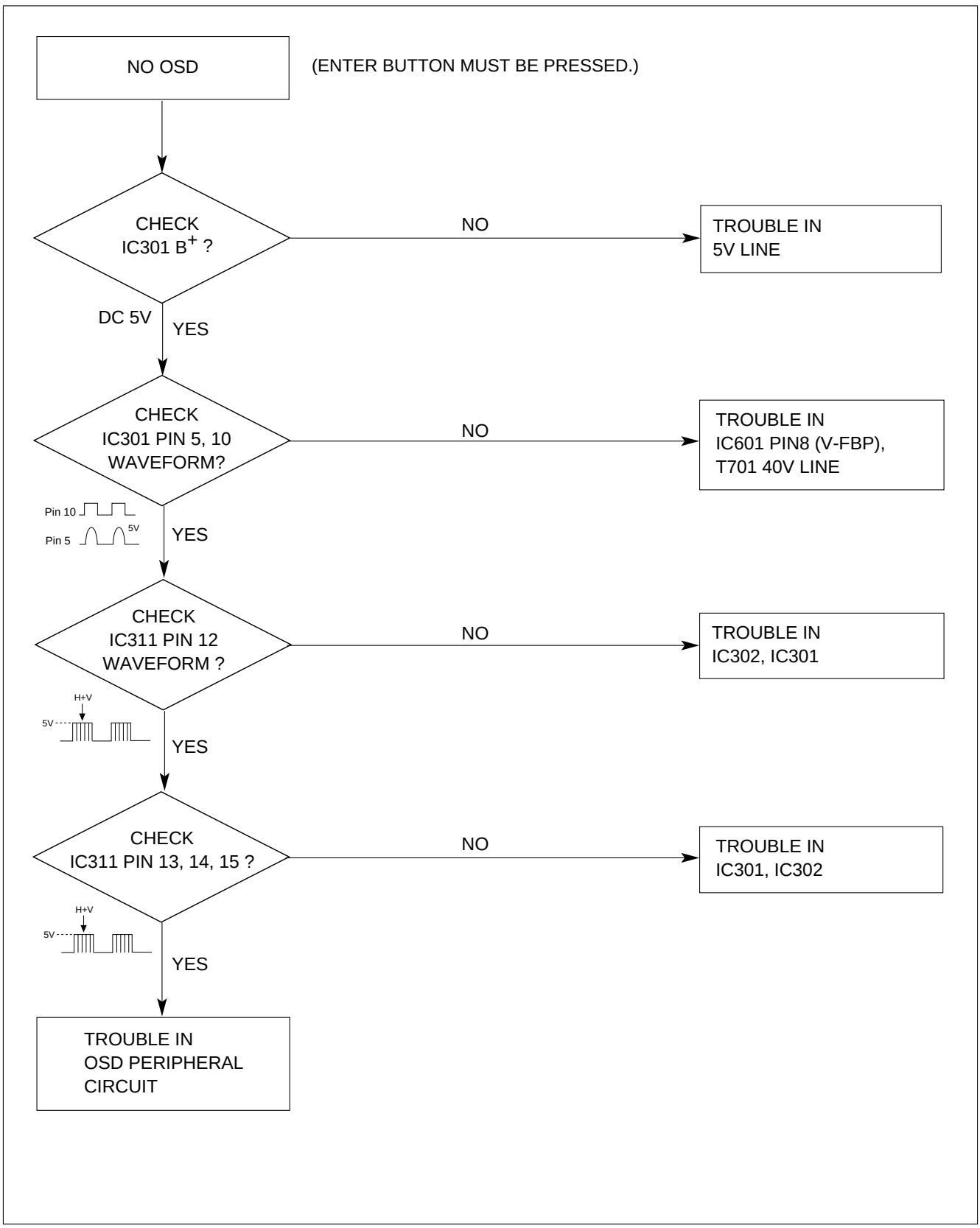
Cs SIGNAL TABLE

HORIZONTAK FREQUENCY(fH)	Cs0	Cs1	Cs2
30K ~ 39K	L	L	L
39K ~ 47.5K	L	L	H
47.5K ~ 62K	L	H	H
62K ~ 70K	H	H	H

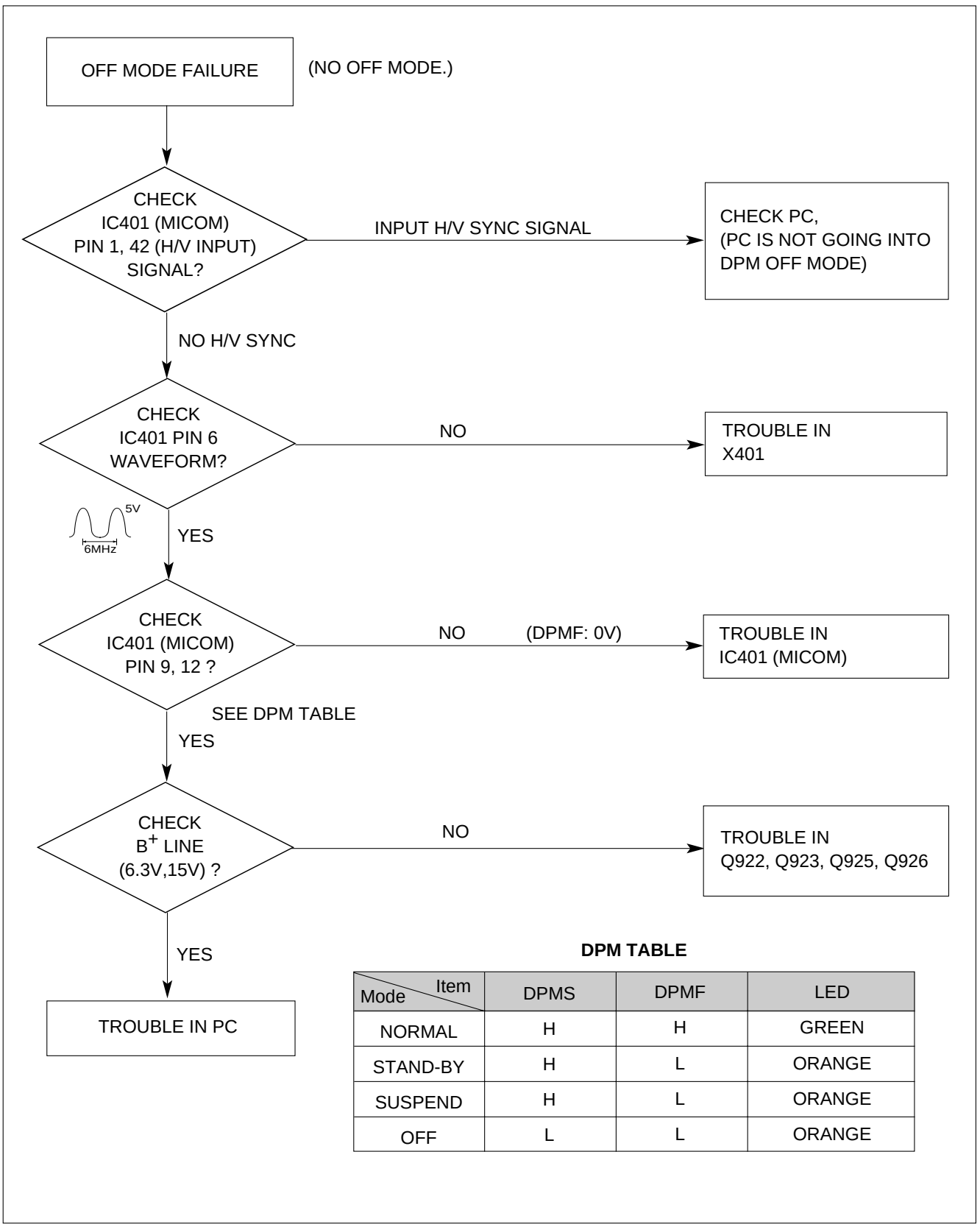
6. NO VERTICAL DEFLECTION



7. TROUBLE IN OSD



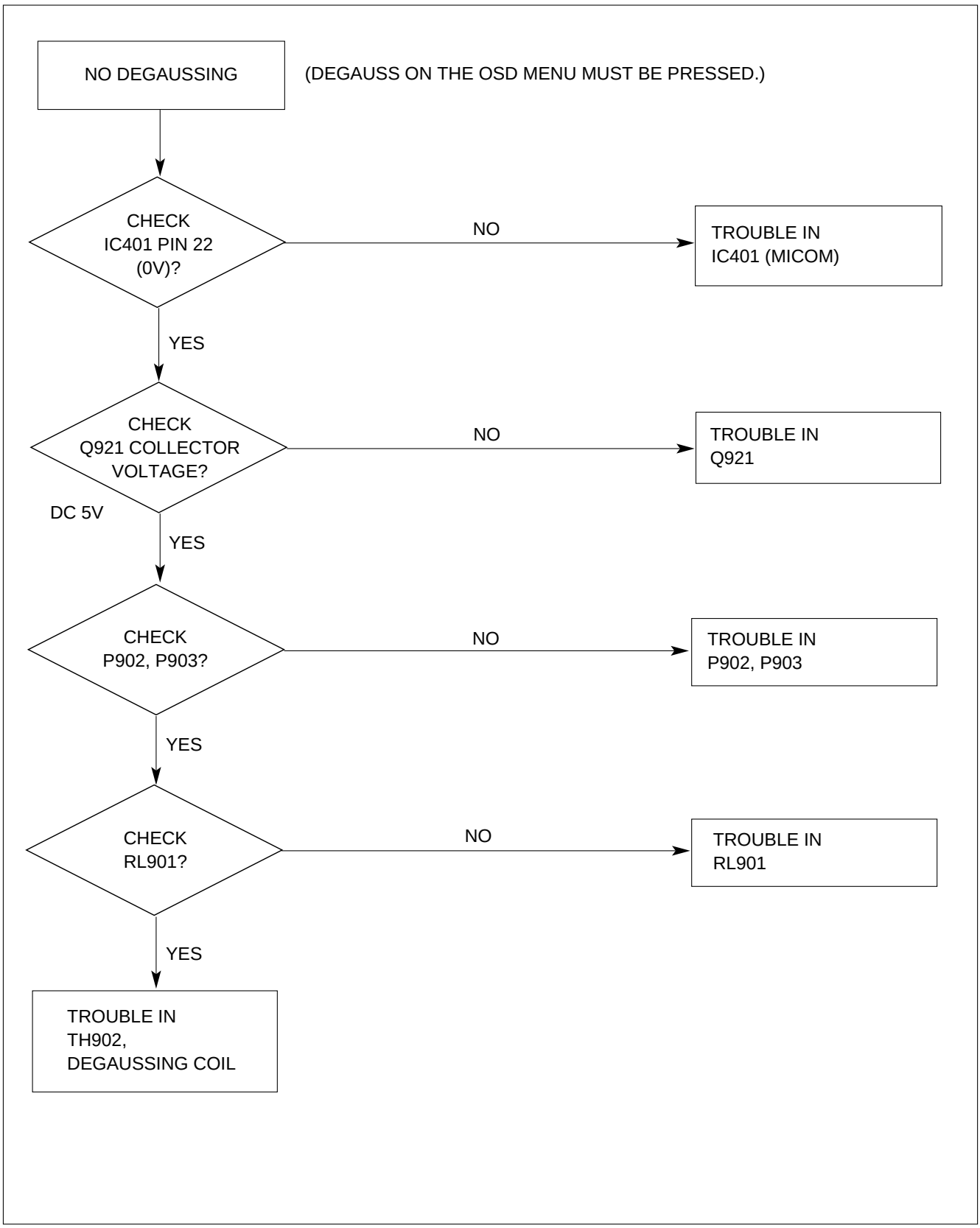
8. TROUBLE IN DPM



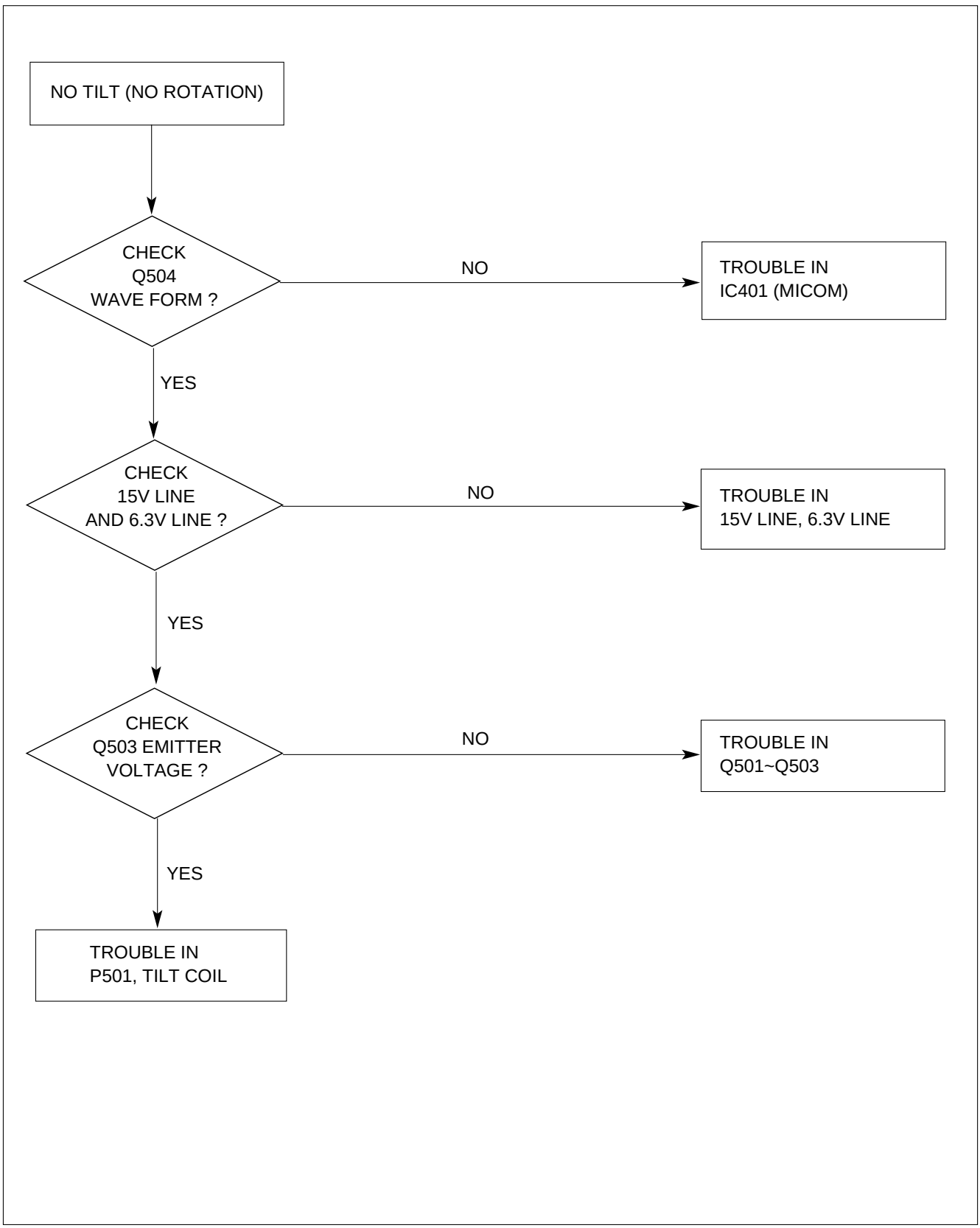
DPM TABLE

Mode \ Item	DPMS	DPMF	LED
NORMAL	H	H	GREEN
STAND-BY	H	L	ORANGE
SUSPEND	H	L	ORANGE
OFF	L	L	ORANGE

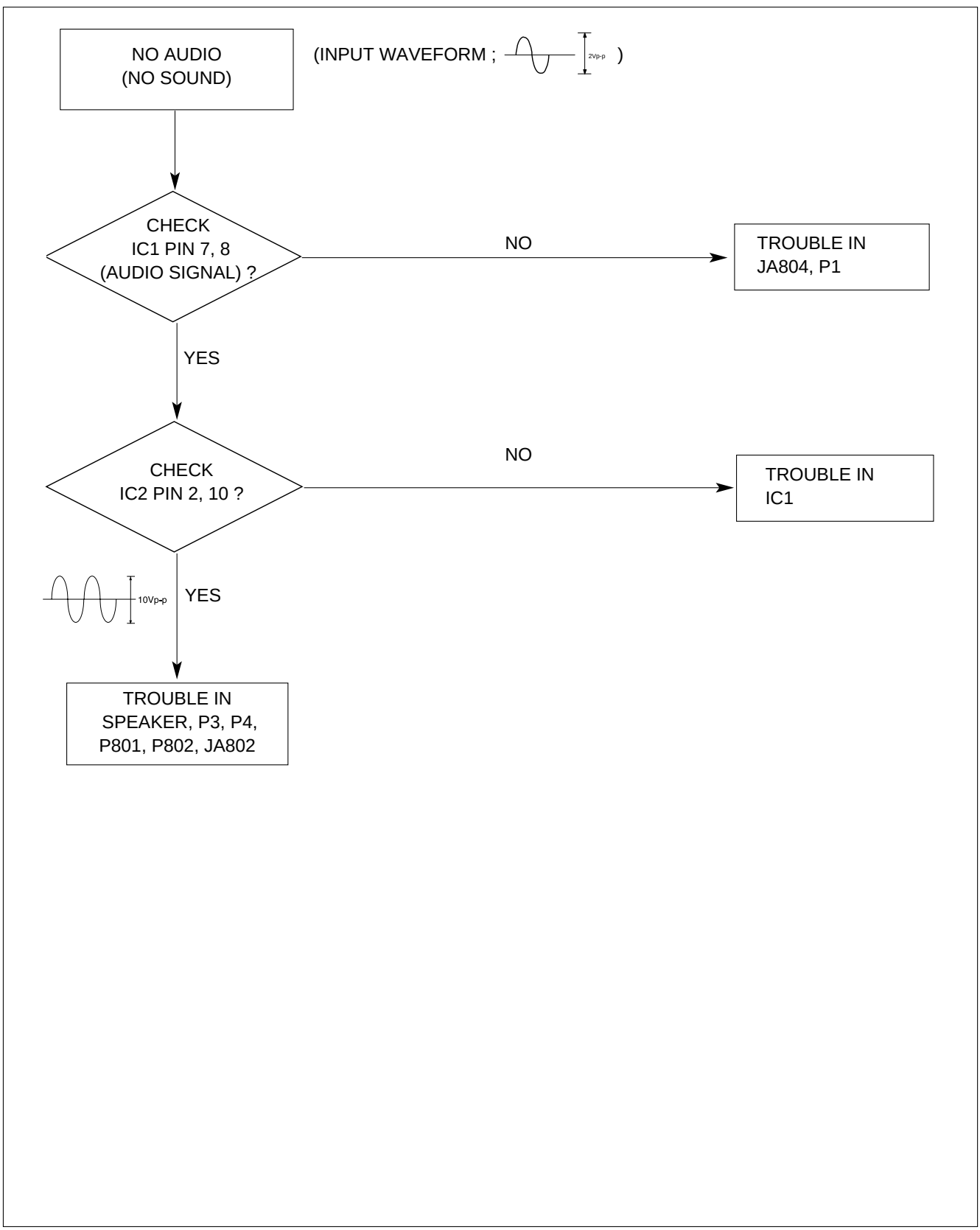
9. NO DEGAUSSING

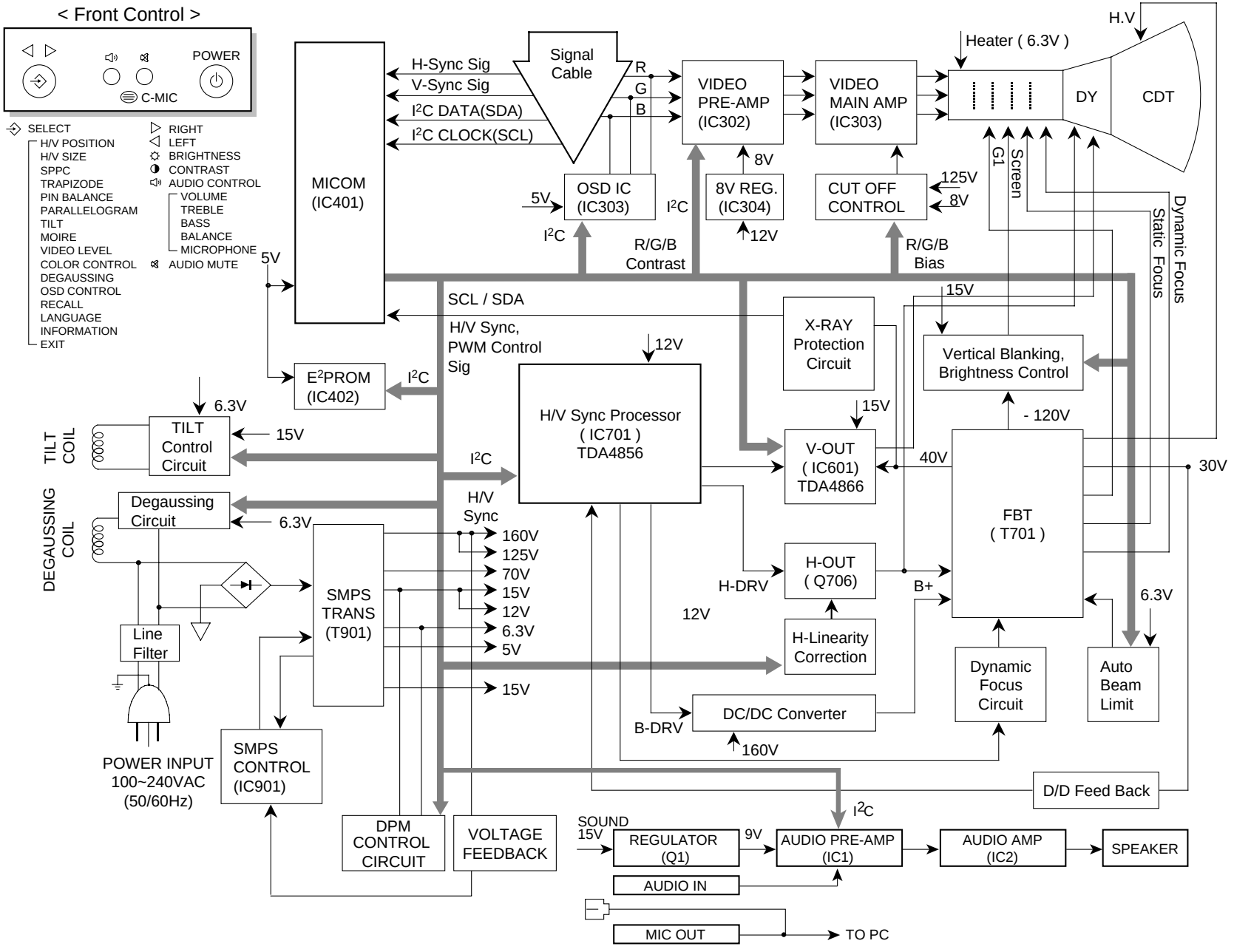


10. NO TILT (NO ROTATION)



11. TROUBLE IN AUDIO




< Front Control >
POWER
C-MIC
SELECT
H/V POSITION
H/V SIZE
SPPC
TRAPIZODE
PIN BALANCE
PARALLELOGRAM
TILT
MOIRE
VIDEO LEVEL
COLOR CONTROL
DEGAUSSING
OSD CONTROL
RECALL
LANGUAGE
INFORMATION
EXIT
RIGHT
LEFT
BRIGHTNESS
CONTRAST
AUDIO CONTROL
VOLUME
TREBLE
BASS
BALANCE
MICROPHONE
AUDIO MUTE
MICOM (IC401)
H-Sync Sig
V-Sync Sig
I2C DATA(SDA)
I2C CLOCK(SCL)
Signal Cable
R
G
B
VIDEO PRE-AMP (IC302)
VIDEO MAIN AMP (IC303)
Heater (6.3V)
H.V
DY
CDT
OSD IC (IC303)
8V REG. (IC304)
CUT OFF CONTROL
125V
8V
5V
I2C
12V
R/G/B Contrast
R/G/B Bias
G1
Screen
Static Focus
Dynamic Focus
SCL / SDA
H/V Sync, PWM Control Sig
E2PROM (IC402)
X-RAY Protection Circuit
Vertical Blanking, Brightness Control
15V
- 120V
6.3V
TILT COIL
TILT Control Circuit
H/V Sync Processor (IC701) TDA4856
V-OUT (IC601) TDA4866
40V
30V
FBT (T701)
DEGAUSSING COIL
Degaussing Circuit
H/V Sync
160V
125V
70V
15V
12V
6.3V
5V
SMPS TRANS (T901)
H-DRV
H-OUT (Q706)
B+
H-Linearity Correction
Dynamic Focus Circuit
Auto Beam Limit
Line Filter
POWER INPUT 100~240VAC (50/60Hz)
SMPS CONTROL (IC901)
DC/DC Converter
B-DRV
160V
D/D Feed Back
DPM CONTROL CIRCUIT
VOLTAGE FEEDBACK
SOUND
REGULATOR (Q1)
9V
AUDIO PRE-AMP (IC1)
AUDIO AMP (IC2)
SPEAKER
AUDIO IN
MIC OUT
TO PC

DESCRIPTION OF BLOCK DIAGRAM

1. Line Filter & Associated Circuit.

This is used for suppressing noise of power input line flowing into the monitor and/or some noise generated in this monitor flowing out through the power input line. That is to say, this circuit prevents interference between the monitor and other electric appliances.

2. Degauss Circuit & Coil.

The degauss circuit consists of the degaussing coil, the PTC(Positive Temperature Coefficient) thermistor(TH901), and the relay(RL901). This circuit eliminates abnormal color of the screen automatically by degaussing the shadow mask in the CRT during turning on the power switch. When you need to degauss in using the monitor, select DEGAUSS on the OSD menu.

3. SMPS(Switching Mode Power Supply).

This circuit is working of 90~264V AC(50/60Hz).
The operation procedure is as follows:

1) AC input voltage is rectified and smoothed by the bridge diodes (D901~D904) and the capacitor (C907).
2) The rectified voltage(DC) is applied to the primary coil of the transformer(T901).
3) The control IC(IC901) generates switching pulse to turn on and off the primary coil of the transformer (T901) repeatedly.
4) Depending on turn ratio of the transformer, the secondary voltages appear at the secondary coils of the transformer(T901).
5) These secondary voltages are rectified by each diode(D902, D922~D924, D926, D927) and operate other circuit. (horizontal and vertical deflection, video amplifier, sound, ...etc.)

4. X-ray Protection.

If the high voltage of the FBT reaches up to 29kV (abnormal state), Q807 operates and IC401(MICOM) pin 11 come to low level. Then MICOM control IC701 (Deflection controller) to stop Horizontal drive pulse and stop Horizontal Deflection.

5. Micom(Microprocessor) Circuit.

The operating procedure of Micom(Microprocessor) and its associated circuit is as follows:

1) H and V sync signal is supplied from the signal cable.
2) The Micom(IC401) distinguishes polarity and frequency of H and V sync.
3) The Micom sets operating mode and offers the controlled data. (H-size, H-position, V-size, ... etc.)
4) The controlled data of each mode is stored in itself.
5) User can adjust screen condition by each OSD function. The data of the adjusted condition is stored in EEPROM(IC402).
6) Users can control screen condition by the OSD, Select, Right, Left, Audio, Audio Mute buttons, and Brightness, Contrast volume.

6. Horizontal and Vertical Oscillation.

This circuit generates the horizontal pulse and the vertical pulse by taking the H and V sync signal.
This circuit consists of the TDA4856(IC701) and the associated circuit.

7. Oscillating Circuit for D/D Converter.

This circuit generates the saw-tooth wave which has the horizontal period by taking output of the TDA4856(IC701).

8. D/D(DC to DC) Converter.

This circuit supplies DC voltage to the horizontal deflection output circuit by decreasing DC 160V which is the secondary voltage of the SMPS in accordance with the input horizontal sync signal.

9. Side-Pincushion & Trapezoid Correction Cirucit.

This circuit improves the side-pincushion and the trapezoid distortion of the screen by mixing parabola and saw-tooth wave to output of the horizontal deflection D/D converter which is used for the supply voltage(B^+) of the deflection circuit.

10. Horizontal Deflection Output Circuit.

This circuit makes the horizontal deflection by supplying the saw-tooth current to the horizontal deflection yoke.

11. High Voltage Output & FBT(Flyback Transformer).

The high voltage output circuit is used for generating pulse to the primary coil of the FBT(Flyback Transformer (T701)). A boosted voltage(about 26kV) appears at the secondary of the FBT and it is supplied to the anode, focus, and screen voltage of the CRT.

12. H-Linearity Correction Circuit.

This circuit corrects the horizontal linearity for each horizontal sync frequency.

13. Vertical Output Circuit.

This circuit takes the vertical ramp wave from the TDA4856(IC701) and performs the vertical deflection by supplying the saw-tooth current to the vertical deflection yoke.

14. Dynamic Focus Output Circuit.

This circuit takes the horizontal and the vertical parabola waves from the TDA4856(IC701) and amplifies it to maintain constant focus on center and corners in the screen.

15. Audio Circuit

MIC circuit sends the microphone sound to PC.

The sound circuit get to the audio gain with the pre-amp (IC1) and the main amp (IC2).

16. H & V Blanking and Brightness Control.

Blanking circuit eliminates retrace line by supplying negative pulse to the G1 of the CRT. And Brightness circuit is used for control of the screen brightness by changing DC level of the G1.

17. Image Rotation (Tilt) Circuit.

This circuit corrects the tilt of the screen by supplying the image rotation signal to the tilt coil which is attached near the deflection yoke of the CRT.

18. Video Pre-Amp Circuit.

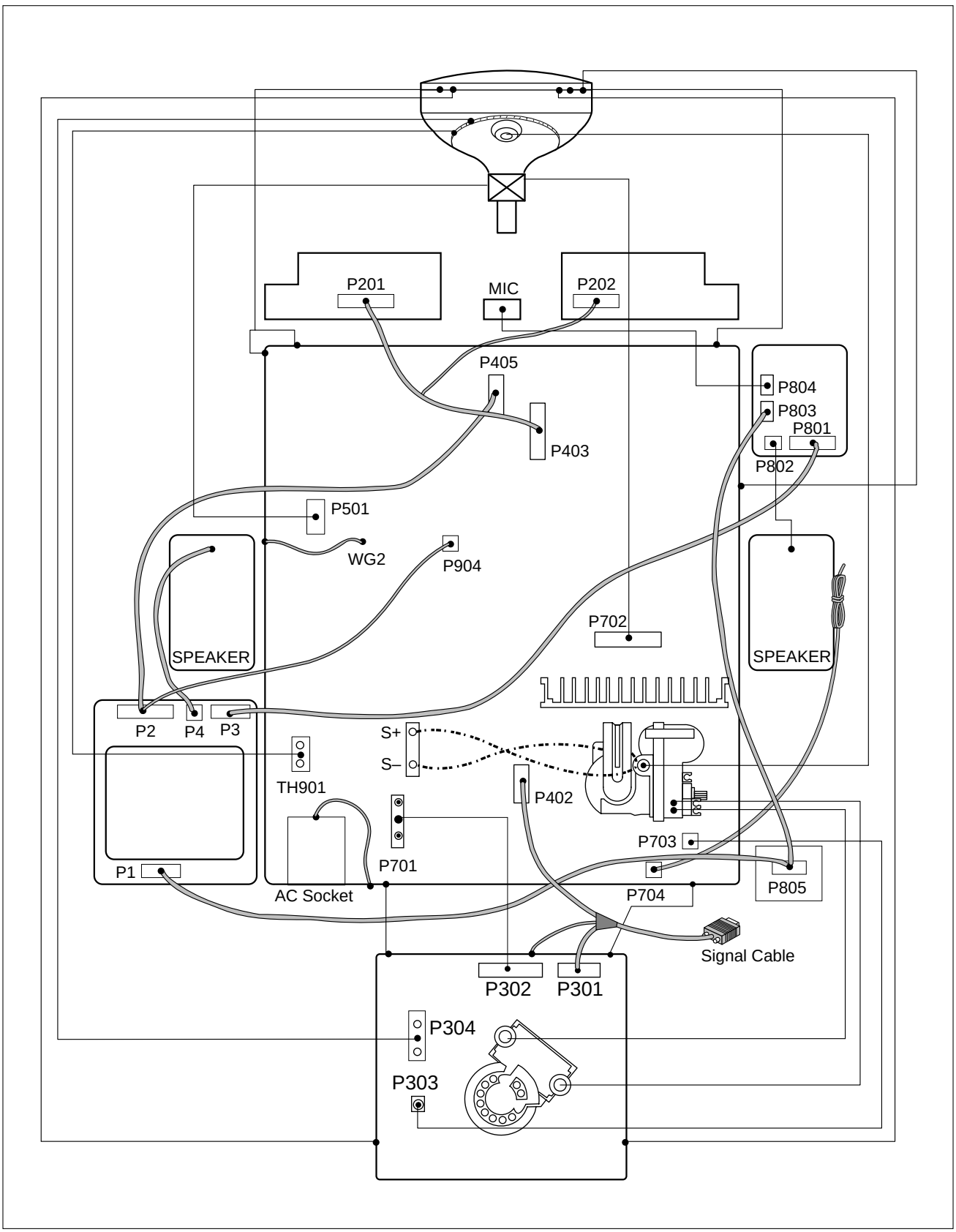
This circuit amplifies the analog video signal from 0-0.7V to 0-4V. It is operated by taking the clamp, R, G, B drive and contrast signal from the Micom(IC401).

19. Video Output Amp Circuit.

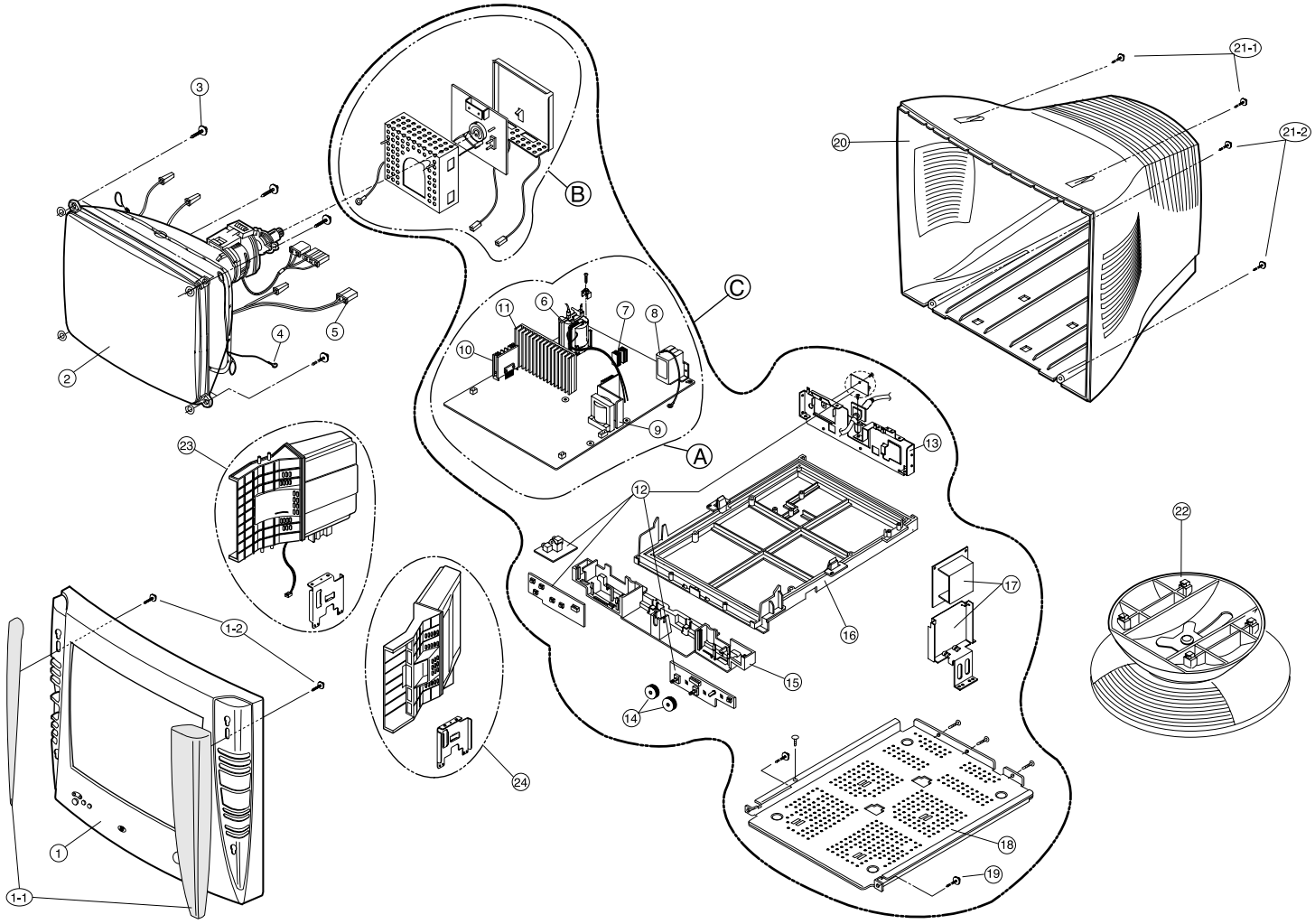
This circuit amplifies the video signal which comes from the video pre-amp circuit and amplified it to applied the CRT cathode.

MB776B SCHEMETIC DIAGRAM 3854T17039A 1999/07/16

WIRING DIAGRAM



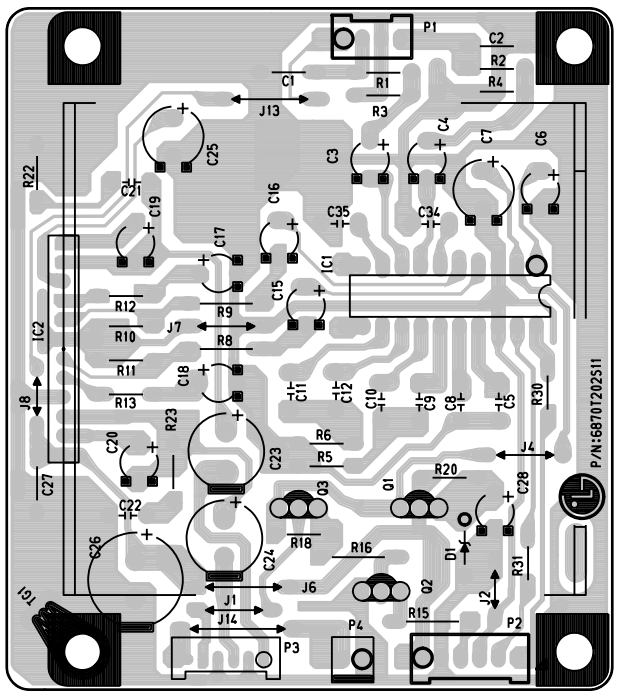
EXPLODED VIEW



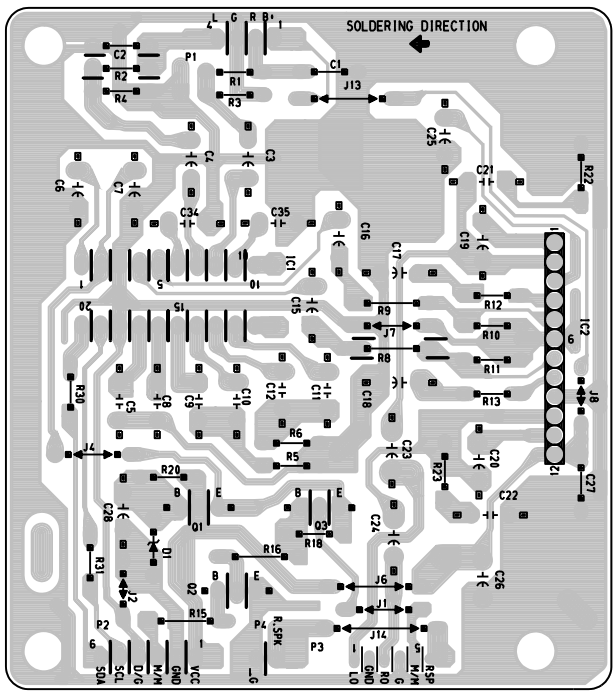
EXPLODED VIEW PARTS LIST

Ref. No.	Part No.	Description	Q'ty	Material
1	3091TKC002U	CABINET ASS'Y, LG, S/W 77S (TCO)	1	LGC ABS AF303G UL94-5V
	3091TKC002V	CABINET ASS'Y, LG, S/W 77M (MPR-II)		
1-1	3551TKS012D	COVER ASS'Y, GRILLE (R/L) (TCO-95)	1	LGC ABS AF303S UL94-V0
	3551TKS012C	COVER ASS'Y, GRILLE (R/L) (MPR-II)		
1-2	332-102D	SCREW, PTP+4x14 (MSWR/FZMY)	2	
2	2423GC0B91V	CDT, M41LFQ913x46NLHD (TCO)	1	
	2423GC0B89Z	CDT, M41LFQ803x46NLAA (MPR-II)		
3	339-002H	SCREW, PHP+5x20+GW18	4	
4	6868T17003C	CDT EARTH	1	
5	6140TC3001A	DEGAUSSING COIL	1	
6	6174Z-1012B	FBT	1	AL (t=2.0)
7	407-S29H	PLATE, HEAT SINK FOR Q719	1	
8	6200TJB001D	FILTER, AC SOCKET	1	AL (t=2.0)
9	407-T73D	PLATE, HEAT SINK FOR IC901	1	AL
10	407-T98M	PLATE, HEAT SINK FOR IC601	1	AL
11	4920TKC003N	COMPRESS, HEAT SINK FOR D704, Q709, Q706	1	
12	6871TST124B	PCB ASS'Y, (CONTROL) SUB TOTAL (TCO-95)	1	
	6871TST124C	PCB ASS'Y, (CONTROL) SUB TOTAL (MPR-II)		
13	4810TKK059A	BRACKET, SIGNAL	1	
14	4940TKC003B	KNOB, CONTROL ROTARY	2	LGC ABS AF303S UL94-V0
15	4810TKV003B	BRACKET, VOLUME (TCO-95)	1	LGC ABS AF303S UL94-V0
	4810TKV003A	BRACKET, VOLUME (MPR-II)		
16	4810TKM004C	BRACKET, MAIN (TCO-95)	1	LGC ABS AF303S UL94-V0
	4810TKM004B	BRACKET, MAIN (MPR-II)		
17	6871TST126B	PCB ASS'Y, AUDIO (TCO-95)	1	
	6871TST126C	PCB ASS'Y, AUDIO (MPR-II)		
18	340-714B	BRACKET, BOTTOM SHELD	1	SBHG1-A (t=1.0)
19	332-102F	SCREW, PTP+4x20	2	
20	3809TKC001L	BACK COVER ASS'Y (TCO-95)	1	LGC ABS AF303G UL94-5V
	3809TKC001K	BACK COVER ASS'Y (MPR-II)		
21-1	332-102H	SCREW, PTP+4x40	2	
21-2	332-102F	SCREW, PTP+4x20	2	
22	3043TKK004G	TILT SWIVEL ASS'Y	1	LGC HIPS 60HR UL94-HB
23	3551TKS014B	SPEAKER ASS'Y (LEFT) (TCO-95)	1	
	3551TKS014A	SPEAKER ASS'Y (LEFT) (MPR-II)		
24	3551TKS013B	SPEAKER ASS'Y (RIGHT) (TCO-95)	1	
	3551TKS013A	SPEAKER ASS'Y (RIGHT) (MPR-II)		
A	6871TMT121B	PCB ASS'Y, MAIN TOTAL (TCO-95)	1	
	6871TMT121C	PCB ASS'Y, MAIN TOTAL (MPR-II)		
B	6871TVT116B	PCB ASS'Y, VIDEO TOTAL	1	
C	3141TZZ045B	CHASSIS ASS'Y, MAIN TOTAL (TCO-95)	1	
	3141TZZ045C	CHASSIS ASS'Y, MAIN TOTAL (MPR-II)		

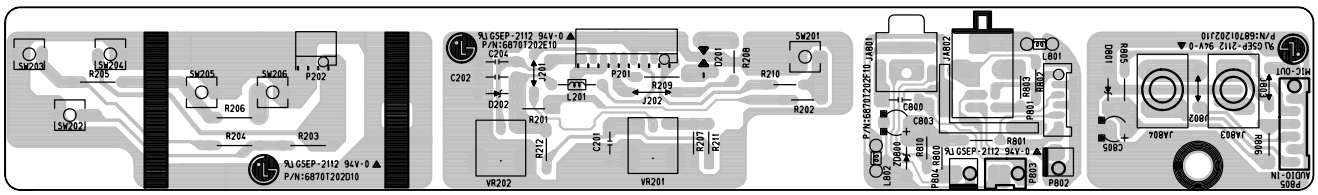
7. AUDIO BOARD (Component Side)



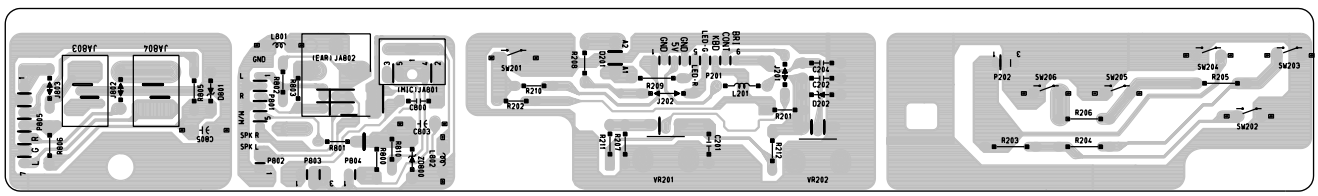
8. AUDIO BOARD (Solder Side)



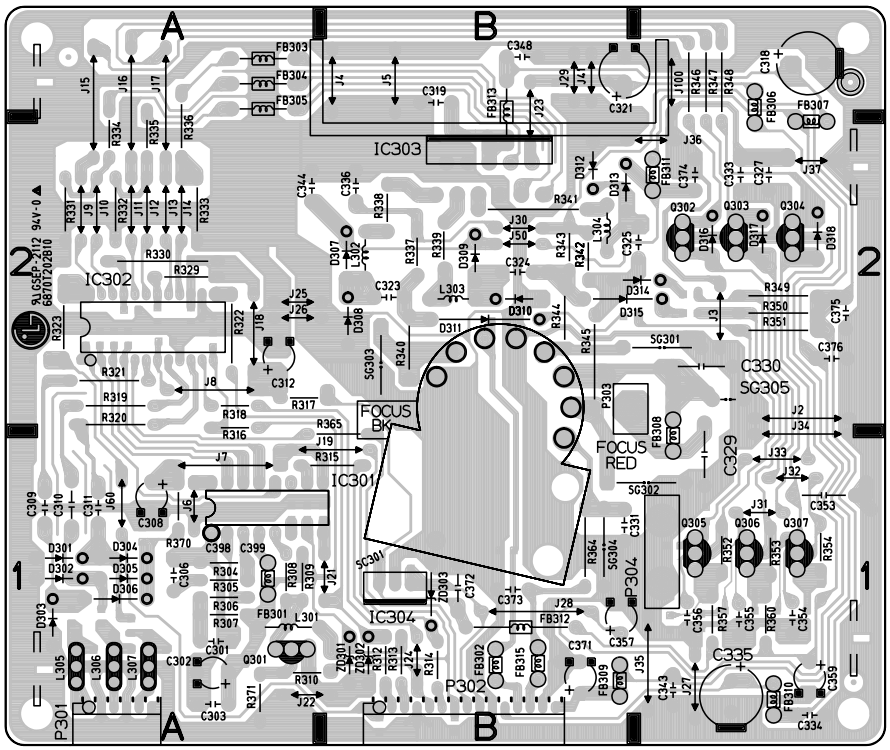
5. CONTROL BOARD (Component Side)



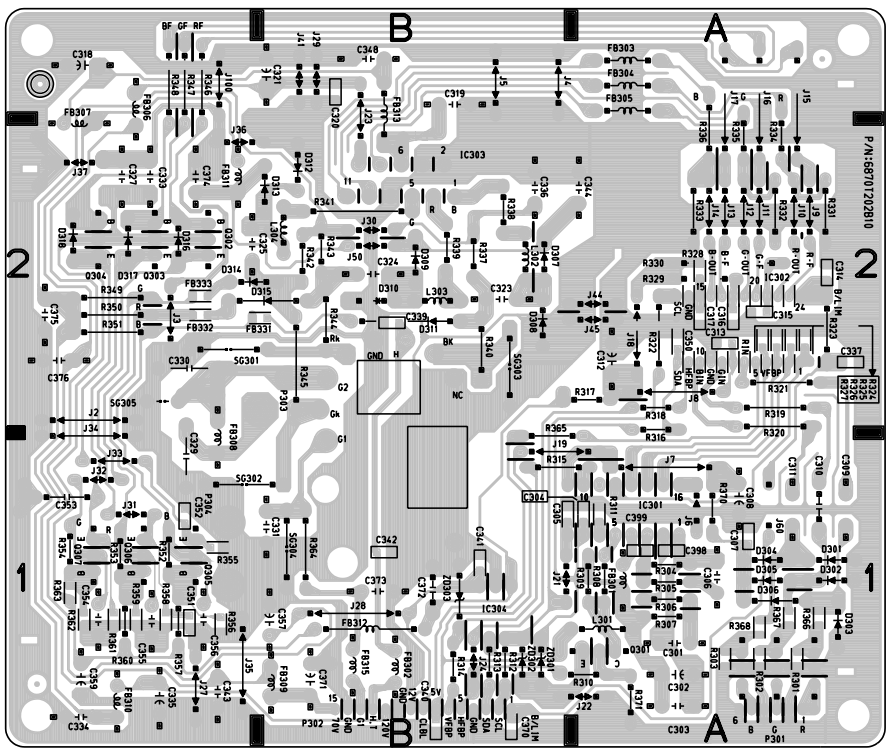
6. CONTROL BOARD (Solder Side)



3. VIDEO BOARD (Component Side)



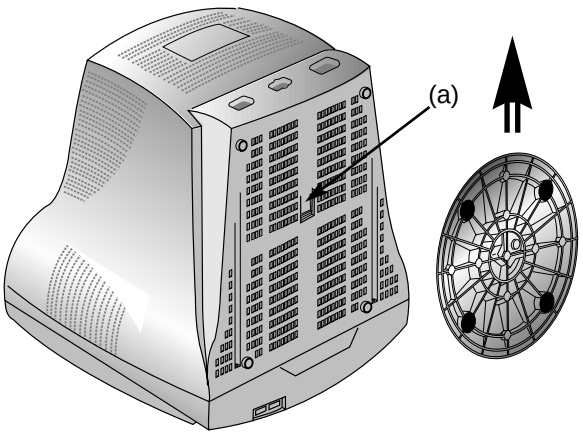
4. VIDEO BOARD (Solder Side)



DISASSEMBLY

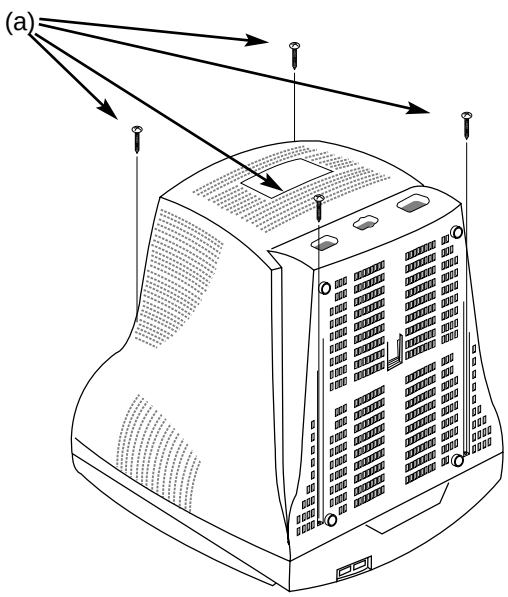
1. TILT/SWIVEL REMOVAL

1) Set the monitor face down.
2) Pressing the latch (a), carefully remove the Tilt/Swivel by pulling it upward.



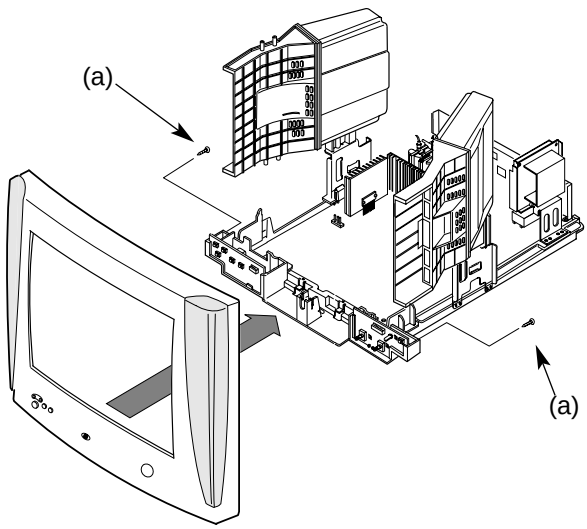
2. BACK COVER REMOVAL

1) Remove four screws (a) from the Back Cover.
2) Slide the Back Cover away from the Front Cabinet of the monitor.



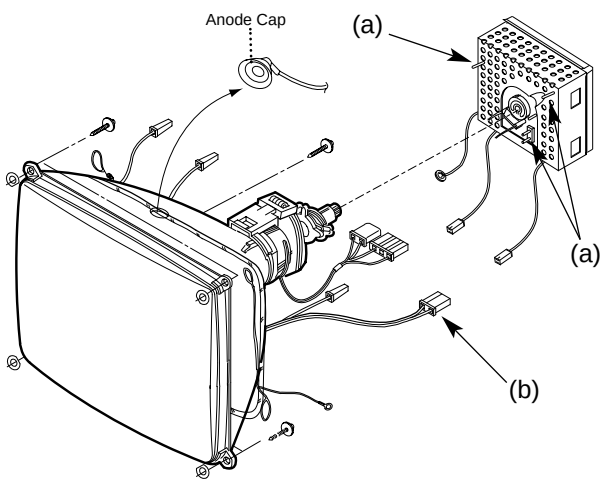
3. TOTAL CHASSIS ASSEMBLY REMOVAL

1) Disconnect P901 (Degaussing pin), P701 (H-DY pin), and P601(V-DY pin).
2) Remove two screws (a) from the Main Bracket to separate it from the Front Cabinet.



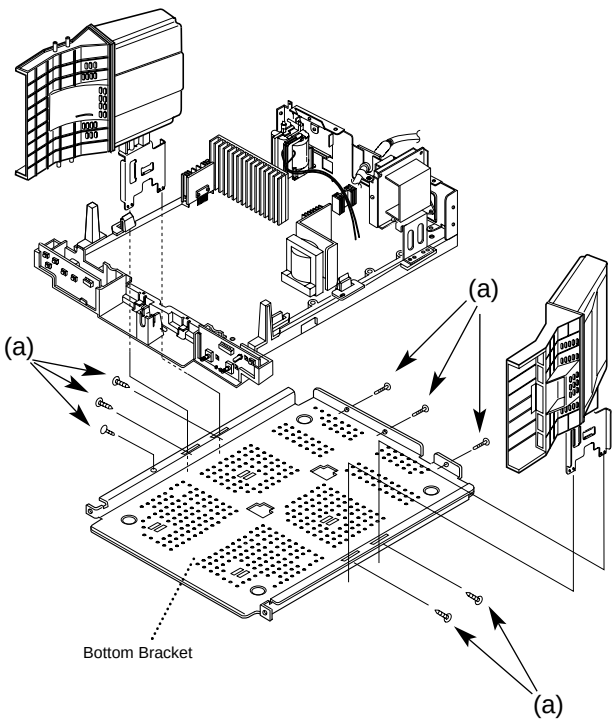
4. CRT BOARD ASSEMBLY REMOVAL

1) Remove three pins (a).
2) Remove the CRT ground connector (b).
3) Carefully separate the CRT Board Assembly from the CRT neck.
4) Discharge the remaining static electricity by shorting between the Anode Cap and the CRT ground.
5) Disconnect the Anode Cap from the CRT.



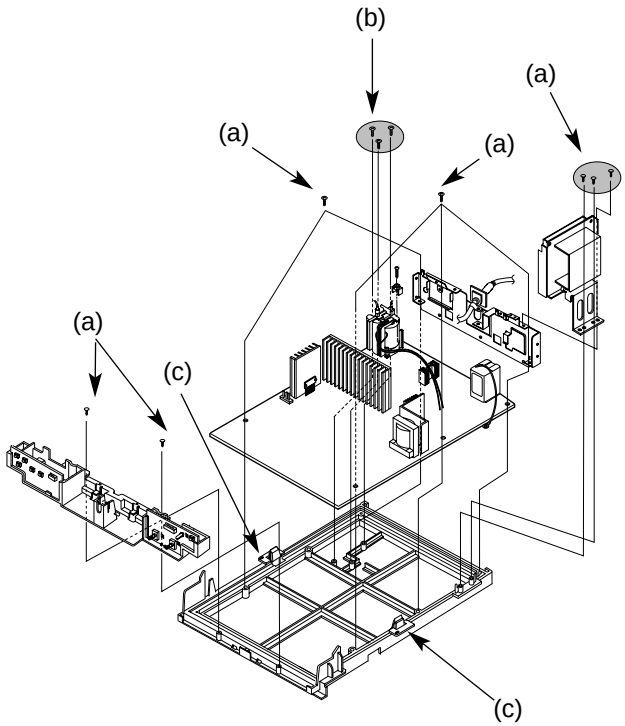
5. BOTTOM BRACKET REMOVAL

1) Remove eight screws (a).
2) Remove the Bottom Bracket.

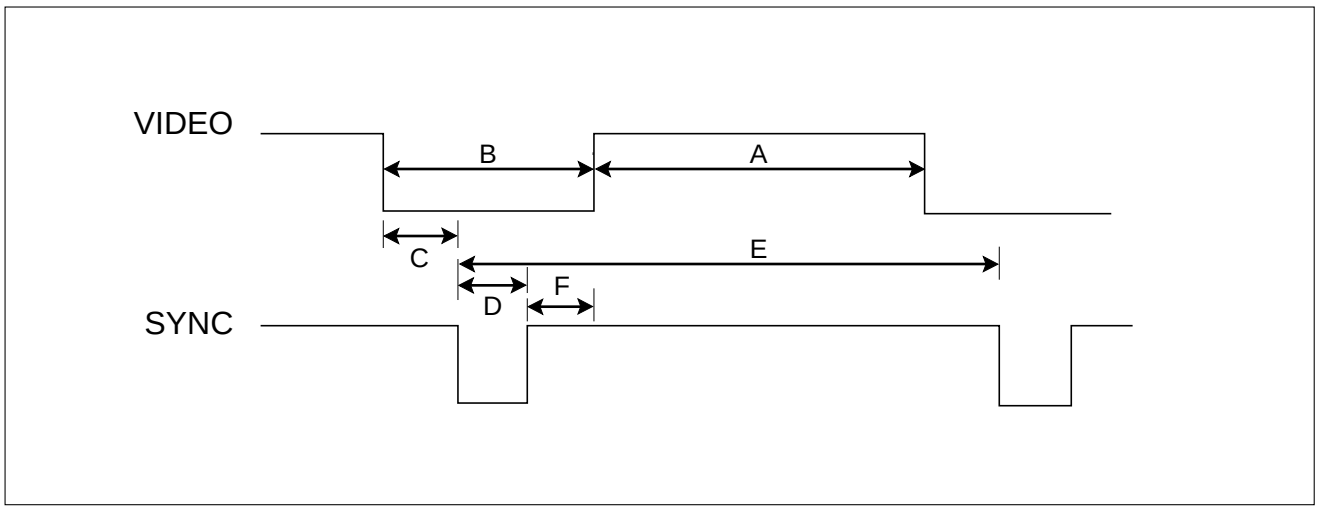


6. MAIN BOARD ASSEMBLY REMOVAL

1) Remove ten screws (a).
2) Remove three screws (b).
3) Release two latches (c) from the Main Board Assembly.



TIMING CHART



MODE			FACTORY PRESET MODE											
			MARK	MODE 1	MODE 2	MODE 3	MODE 4	MODE 5	MODE 6	MODE 7	MODE 8	MODE 9	MODE 10	MODE 11
HORIZONTAL	Sync Polarity			—	+	+	+	—	—	—	—	—	+	+
	Frequency	kHz		37.50	46.88	53.68	68.677	31.47	31.47	37.88	43.27	49.75	60.02	63.98
	Total Period	µs	E	26.67	21.33	18.63	14.561	31.78	31.78	26.40	23.11	20.10	16.66	15.63
	Video Active Time	µs	A	20.32	16.16	14.22	10.836	25.42	25.42	20.00	17.78	14.52	13.00	11.85
	Blanking Time	µs	B	6.35	5.17	4.41	3.725	6.36	6.36	6.40	5.33	5.58	3.66	3.78
	Front Porch	µs	C	0.51	0.32	0.57	0.508	0.64	0.64	1.00	0.89	0.55	0.20	0.44
	Sync Duration	µs	D	2.03	1.62	1.14	1.016	3.81	3.81	3.20	1.33	1.12	1.22	1.04
	Back Porch	µs	F	3.81	3.23	2.70	2.201	1.91	1.91	2.20	3.11	3.91	2.24	2.30
VERTICAL	Sync Polarity			—	+	+	+	+	—	+	—	—	+	+
	Frequency	Hz		74.99	75.01	85.07	85.00	70.08	59.94	60.32	85.01	74.95	75.03	60.02
	Total Period	ms	E	13.335	13.331	11.755	11.764	14.269	16.684	16.579	11.763	13.407	13.328	16.661
	Video Active Time	ms	A	12.802	12.798	11.178	11.182	12.712	15.254	15.840	11.093	12.542	12.795	16.005
	Blanking Time	ms	B	0.533	0.533	0.577	0.582	1.557	1.430	0.739	0.670	0.865	0.533	0.656
	Front Porch	ms	C	0.026	0.021	0.018	0.014	0.414	0.318	0.026	0.023	0.021	0.017	0.015
	Sync Duration	ms	D	0.080	0.064	0.056	0.044	0.063	0.063	0.106	0.069	0.060	0.050	0.047
	Back Porch	ms	F	0.427	0.448	0.503	0.524	1.080	1.049	0.607	0.578	0.784	0.466	0.594
Resolution				**640 x 480 75Hz**	**800 x 600 75Hz**	**800 x 600 85Hz**	**1024 x 768 85Hz**	**640 x 400 70Hz**	**640 x 480 60Hz**	**800 x 600 60Hz**	**640 x 480 85Hz**	**832 x 624 75Hz**	**1024 x 768 75Hz**	**1280 x 1024 60Hz**
Recall				Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

* Mode 1~Mode 4: Basic Mode (Mode 5~Mode 11: Default Mode)